

REMARKS

This application is believed in condition for allowance and reconsideration is respectfully requested.

Status of the Claims

Claims 20-39 remain in this application.

Claims 20 and 27 are amended to clarify the previously recited features.

Claims 29-38 remain withdrawn from consideration for being directed to a non-elected invention.

Information Disclosure Statement

Although Applicants understand that the Patent Office should have received the references cited in the International Search Report from the International Search Authority, a courtesy copy of these references is provided in the Appendix of this response.

Accordingly, consideration of these references is respectfully requested.

Claim Rejections-35 USC §103

Claims 20 and 22-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over VOLLMAR et al. US 6,162,556 (VOLLMAR) in view of KOGA US 6,003,634(KOGA) and DECKMAN et al.

US 6,830,596 (DECKMAN). This rejection is respectfully traversed for the reasons below.

VOLLMAR was offered for teaching the conversion of CO and water into hydrogen, wherein the feed to the shift reactor comprises an anode off-gas. The Official Action acknowledged that VOLLMAR fails to teach converting CO on one side of a membrane in the presence of water and passing H₂ through the membrane to be combusted with oxygen on the other side, as recited in claim 20.

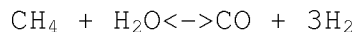
KOGA was offered for teaching converting CO and H₂O into H₂ and CO₂, and DECKMAN was offered for combusting H₂ on the permeate side of a membrane.

The position of the Official Action included two points: (1) it would have been obvious to integrate the hydrogen separation step and the shift reaction step of VOLLMAR, as suggested by KOGA, in order to provide a more compact system, i.e., a combination of two structures into one, and (2) it would have been obvious to add the hydrogen combustion process step of DECKMAN to the process of VOLLMAR.

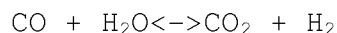
However, even if one were to combine these documents would not achieve the claimed method described in independent claim 20.

DECKMAN explicitly discusses a reforming reaction (See

column 1, description of the related art, lines 20-44 and claim 1). This reforming reaction is carried with a hydrocarbon composition as the feed (stream 1, column 12, lines 24-27). If methane is used as feed, the following reaction will occur:



The subsequent reaction is the water gas shift reaction:



Accordingly, the reforming reaction must be carried out in order to obtain CO so that shift reaction can be carried out.

In the claimed method, however, the conversion of CH₄ to CO and CO₂ has already been completed, e.g., in a fuel cell. Instead, the claimed method converts CO from a feed to form CO₂.

Both in claim 20 and KOGA, the feed of the membrane reactor substantially comprises CO, H₂, H₂O and CO₂. Indeed, as disclosed in both the present application and KOGA only small quantities of CH₄ may exist. However, this CH₄ is not converted in the reaction. Only the shift reaction is carried out at the feed side of the membrane reactor and not the reforming reaction.

Thus, the proposed combination fails to teach, or suggest, the method of claim 20, and claims 20-28 and 39 are unobvious.

Therefore, withdrawal of the rejection is respectfully requested.

Conclusion

In view of the amendment to the claims and the foregoing remarks, this application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Robert A. Madsen/
Robert A. Madsen, Reg. No. 58,543
209 Madison Street, Suite 500
Alexandria, VA 22314
Telephone (703) 521-2297
Telefax (703) 685-0573
(703) 979-4709

RAM/fb

APPENDIX:

- EP 1 033 769
- WO 99/61397